

Project Descriptions of Fire Ecology/Fuels Data within the Alaska Region National Park Service *FFI Database: AKRO*

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Parks included in dataset:

- Yukon-Charley Rivers National Preserve (YUCH) in Alaska
- Wrangell-St. Elias National Park & Preserve (WRST) in Alaska

Projects:

WRST_McCARTHY_UNIV_SUB_HZF - Wrangell's McCarthy University Subdivision Thinning Plots (2011-2012)

FFI Data Management: All data has been entered into FFI (Database: FFI-AKRO, Project: WRST_McCarthy_Univ_Sub-HZF). Data collection years 2011, 2012.

Purpose and Objectives: Wrangell-St. Elias National Park and Preserve (WRST) and NPS Eastern Area Fire Management conducted a hazard fuels reduction project on NPS and State lands adjacent to the McCarthy University Subdivision near the rural community of McCarthy, AK. The purpose of the shaded fuel break was to reduce the potential of extreme fire behavior and to create more defensible space in the event of a wildfire near the community of McCarthy. The purpose of this study was to document the pre- and post-treatment condition of the vegetation and fuels in the McCarthy University Subdivision Boundary shaded fuels buffer area. The area is forested with a mosaic of white spruce, black spruce, broadleaf and mixed deciduous and spruce forest as well as non-forested areas dominated by low shrubs.

A hazard fuels reduction plan was developed near the McCarthy University Subdivision. A 100' shaded fuel break was proposed to be constructed. The treatment prescriptions are as follows:

- 1) *6' Bole spacing between needleleaf trees*- needleleaf trees will be mechanically thinned; needleleaf tree bole spacing will be 6 feet between tree boles.
- 2) *Needleleaf tree limbing to ≥ 5 feet*- needleleaf trees will be mechanically limbed; live and dead ladder fuels lower than 5 feet up the tree bole from the ground surface will be removed.
- 3) *Large woody debris removed*- 100hr and 1000hr fuels will be removed by hand; 80% of 100hr and 1000hr fuels will be removed.
- 4) *Tall shrub density reduction*- dead and decadent shrubs will be mechanically thinned; 80% of shrubs greater than 50% dead will be removed.
- 5) *Deciduous trees retained*- live deciduous trees will not be removed.
- 6) *Hazard tree mitigation*- dead trees will be mechanically removed.

Monitoring Goal:

- 1) Evaluate the success of the hazard fuels treatment in meeting prescription objectives
- 2) Monitor the short- and long-term effects of the fuel treatment on vegetation and fuels
- 3) Model the effects of the fuels treatment on fire behavior

Sampling: 27 monitoring plots were established within thinning treatment zone at the McCarthy University Subdivision in 2011 prior to thinning. The plots were re-measured in 2012 and are scheduled to be revisited in 2016.

Methods: Twenty-seven plots were established in 2011, pre-thinning. The plots are circular with a 4-m or 8-m radius (8-m or 16-m diameter), depending on tree density pre-treatment. A 16-m transect runs South to North for point intercept and photos. All plots are marked with wooden stakes at the center of the plot. At each visit photos were taken of each plot and data collected included: point intercept cover estimates of vegetation and ground cover (32 points, every 0.5-m along 16-m baseline), tree densities within circular plot area, tree measurements, Brown's woody transects, shrub density, invasive plant survey and general site descriptions.

Methods Protocol: AKR Fire and Fuels Monitoring Protocol Circular Plot 2012 Final.pdf

WRST-CARL-CR-RX - WRST Carl Creek Proposed RX Burn Monitoring Plots (2010)

FFI Data Management: Data has been entered into FFI (Database: FFI-AKRO, Project: WRST-Carl-Cr-RX).

Purpose and Objectives: Wrangell-St. Elias National Park and Preserve (WRST) and NPS Eastern Area Fire Management proposed a prescribed fire in the Carl Creek area in WRST in order to enhance wildlife habitat by restoring and maintaining biological heterogeneity. 29 pre-fire plots were established in 2010.

Prescribed Fire Objectives:

1. Increase grass/sedge cover by 20%
2. Decrease shrub cover (willow, alder and birch) within the burn unit by 30-50%
3. Determine changes in dominant plant species cover post-fire
4. Provide post-fire measure of duff reduction of .25 inches across unit.

Monitoring Objectives:

Sampling plots will be established prior to ignition to collect and record information on: 1) grass cover, 2) shrub and tree cover and status (live, dead, top-killed), 3) dominant plant species composition and 4) duff reduction. Pre-fire monitoring will be conducted prior to ignition. Post fire monitoring will be conducted at a minimum one year post fire to determine if management objectives were met and to adjust prescription for future treatments. The primary objectives of this monitoring project include:

1. Measuring changes in shrub and graminoid cover resulting from prescribed fire treatment
2. Recording other changes in dominant vegetation cover resulting from prescribed fire treatment.
3. Measuring the extent of duff consumption resulting from prescribed fire treatment.

Sampling: In 2010 twenty-nine pre-fire monitoring plots were established within the proposed Carl Creek Rx Fire perimeter. Project has been put on hold and no other sampling has occurred.

Methods: The plots are 8-m radius (16-m diameter) circular plots marked with welding rod at both ends of a bisecting 16-m radius transect. Photo points are taken at each plot and data collected includes: vascular and non-vascular plant ocular cover, point intercept (32 points on 16-m transect) for vegetation and substrate cover and general site descriptions.

Methods Protocol: CarlCreek_RX_Monitoring_Protocol_2010_July8.doc.

WRST-CHAKINA-FIRE-EFFECTS - WRST Chakina Fire Spruce Bark Beetle and Pre/Post Fire Effects Plots (1997-98, 2009-2010)

FFI Data Management: Data has been entered into FFI (Database: FFI-AKRO, Project: WRST-Chakina-Fire-Effects). 8 plots from 1997-99 spruce beetle study and 4 plots established in front of the fire have been entered into FFI. Original larger study of Spruce Beetle plots from 1997-99 (136 plots) has not been entered into FFI.

Purpose and Objectives: In 2009 the Chakina Fire (Fire #362) burned 56,413 acres in WRST. This is the largest recorded fire in WRST since park establishment. The occurrence of this fire provides a unique opportunity to both monitor post-fire successional patterns and compare fire effects in stands that have been affected by spruce bark beetle to those unaffected. Notably, 8 spruce bark beetle plots established in 1997 & 1998 and a single pre-post fire effects plots established in 2009 in front of the fires were burned in the Chakina Fire.

The project was designed as a long-term study with the objectives of: 1) monitoring rates of vegetation re-colonization and succession, 2) evaluating fire fuel types and quantity for fire management purposes, and 3) evaluating burn severity and determining changes in permafrost depth after a fire event.

Sampling: Eight 1997/98 spruce bark beetle plots which were burned in the 2009 Chakina Fire were revisited in 2010. Four pre-post fire effects plots were established in front of the active fire in 2009. Only one plot burned and this plot was revisited in 2010 (PPF-362-1). Plot revisits are tentatively scheduled for five year post-fire, 2014.

Methods: A modified version of the NPS Alaska Regional Fire and Fuels protocol was utilized for data collection at all plots. Plots are 30-m x 2-m belt transects marked with rebar. Plot data collection includes: vascular and non-vascular species ocular cover estimates, point intercept to measure ground and vegetation cover, tree density by species and diameter size class within 60-m² area, tree measurements, thaw depths, general site descriptions and photo points. CBI data was collected at all sites.

Methods Protocol: AKR Fire and Fuels Monitoring Protocol Belt Transect 2011.docx (earlier version of this protocol) (modified for 30-m x 2-m belt transects)

WRST-HQ- HZF - WRST Headquarters Hazard Fuels Reduction Monitoring (2009 -2012)

FFI Data Management: All data has been entered into FFI (Database: FFI-AKRO, Project: WRST-HQ-HZF).

Purpose and Objectives: In 2009 Wrangell-St. Elias National Park and Preserve (WRST) fire management staff developed a Hazard Fuels Management Plan near WRST Headquarters and Seasonal Housing areas. The main goal of the mechanical thinning project outlined in the Hazard Fuels Management Plan is to provide defensible space and minimize hazard tree risk near WRST Headquarters and Seasonal Housing areas. Thinning prescription for a ~100' buffer around headquarters and visitor center area was 3-5' bole spacing of spruce and dead standing trees and 5' limbing of spruce. Burn piles were burned on- site and off-site. Thinning was implemented in 2010

The purpose of this study is to document the pre- and post-treatment condition of the vegetation and fuels in the area surrounding headquarters structures and along the headquarters access road which scheduled to have mechanical fuels thinning in the WRST Headquarters Area. Predominant forest types in the area are: dense white spruce forest and open aspen-white spruce forest types, with a mixed understory of soapberry (*Shepherdia canadensis*), willow (*Salix* spp.), cranberry (*Vaccinium vitis-idaea*) and feathermosses (*Hylocomium splendens*, *Pleurozium schreberi*).

The specific monitoring goals of this study are to:

- 1) evaluate the implementation of the hazard fuels prescription described above,
- 2) monitor the effects of the fuels treatments on vegetation and fuels and
- 3) model the effects of the fuels treatment on fire behavior (modeled).

Sampling: Eighteen monitoring plots were established in 2009, prior to implementation of the fuels treatments in 2010. Twelve treatment plots and six control plots were established. Most plots were re-measured in 2011, however not all areas had thinning completed – so 4 plots were re-measured in 2012. Some plots were newly established in 2011, pre-treatment and other plots that were intended to be control plots ended up as thinned plots. Data has been corrected to reflect these plot type changes. Plots will be revisited 5-yr post treatment in 2015.

Methods: In 2009 eighteen plots were established pre-treatment at the WRST Headquarters site and are marked with wooden stakes at the center of the plots. The plots are circular with a 4-m or 8-m radius (8-m or 16-m diameter), depending on tree density pre-treatment. At each plot visit photos were taken of each plot and data collected included: vascular and non-vascular plant ocular cover, tree densities within circular plot area, tree measurements, and general site descriptions.

Methods Protocol: WRST_HZF_MonitoringProtocol_June8_2009_Final.doc and AKR Fire and Fuels Monitoring Protocol Circular Plot 2012 Final.pdf

WRST-Smith-HZF - WRST Smith Fuels Reduction Monitoring (2009-2010)

FFI Data Management: The 2009 and 2010 data have been entered into FFI (Database: FFI-AKRO, Project: WRST-Smith-HZF).

Purpose and Objectives: This project was requested by private land owners adjacent to National Park lands. The purpose of the NPS fire management program was to reduce the potential of extreme fire behavior and to create more defensible space near private property boundaries that reside adjacent to Wrangell St. Elias National Park. Both the private and federal lands are currently in a Full Fire Management zone where wildland fire is actively suppressed. This area is predominantly white spruce and black spruce forest types. Some level of spruce beetle activity was present when the monitoring plots were established in 2009. The purpose of this study was to document the pre- and post-treatment condition of the vegetation and fuels in the area within the thinning treatment and adjacent control areas. Monitoring goals include: 1) measuring tree density reductions, 2) documenting trees with insect and disease damage, 2) measuring down-woody biomass reduction, 4) providing repeatable photo point documentation.

Sampling: In 2009 thirteen plots were established pre-treatment at the Smith site. Ten treatment plots and three control plots were established. All of the plots were re-visited in 2010.

Methods: The plots are circular with a 4-m or 8-m radius (8-m or 16-m diameter), dependent on tree density pre-treatment. Plots are marked with wooden stakes at the center of the plots. At each plot visit photos were taken and data collected included: general site descriptions and tree densities by diameter size class and species within the circular plot. Additionally, a 16-m south to north transect was laid out at each plot for measures of fuel loading (Brown's transects). *Protocol:* WRST_HZF_SusanSmith_Monitoring_2010_Final.docx

YUCH-WDC-PPF - YUCH Woodchopper Fire Monitoring Plots at Coal Creek (2004-2008)

FFI Data Management: In 2008 data entry and transfer into FFI was completed (Database: FFI-AKRO, Project: YUCH-WDC-PPF).

Purpose and Objectives: 2004 was a record fire year throughout interior Alaska and in Yukon-Charley Rivers NP. The Woodchopper Fire near the NPS summer operations base camp at Coal Creek burned 14,901 acres in 2004. This was largely a pilot study that was initiated to determine the feasibility of installing fire effects plots in front of an active fire in order to document the pre and post condition of the vegetation and fuels. Plots were established to study how fire burned through varying vegetation types (deciduous vs. conifer vegetation classes) and the relative fire effects on vegetation and permafrost.

Sampling: During 2004 and 2005 seven monitoring plots within the 2004 Woodchopper Fire perimeter were established. Pre-fire vegetation at 4 of the 7 plots was Black Spruce Woodland (conifer plots). Pre-fire vegetation at the remaining 3 plots was Closed Paper Birch Forest (deciduous plots). Two of the conifer plots were established ahead of the fire event in 2004. An unburned control plot was established for comparison to burned deciduous sites in 2005. Plots have been re-measured in 2004, 2005, 2006 (black spruce plots only), and 2008.

Methods: Plots are 30-m x 1-m belt transects and are marked with rebar at each end of the transect. Plot data collection includes: vascular and non-vascular species ocular cover estimates, point intercept (60 points on a 30-m transect) to measure ground and vegetation cover, tree density by species and diameter size class within 30-m² area, tree measurements, thaw depths, burn severity points along transect (where applicable), general site descriptions and photo points. *Protocol:* AKR Fire and Fuels Monitoring Protocol Belt Transect 2011.docx (and earlier versions of this protocol)

YUCH-LC-CBI - YUCH Landcover CBI (Composite Burn Index) (2014)

FFI Data Management: All data has been entered into FFI (Database: FFI-AKRO, Project: YUCH-LC-CBI)

Purpose and Objectives: Landcover and vegetation maps atrophy over time and become less relevant, particularly in areas susceptible to large natural disturbances, including wildfires. Although the YUCH landcover map was completed in 1997, it was primarily developed from Landsat imagery acquired in 1991. Since then, 36 fires have burned over 835,000 acres within the preserve. Project objectives

include: 1) determine 10-20 year post-fire successional patterns under varying burn severities; and 2) develop a vegetation succession model that can be used to update areas in the landcover map that have burned since 1991.

Sampling: Sampling locations were based on 2001 burn severity plots that were established within three 1999 fires: 1) Witch Fire (B242) – 47,779 acres, 2) Beverly Fire (B248) – 20,753 acres, and 3) Jessica Fire (B260) – 49,334 acres. Fifteen year post-fire vegetation data was collected in 31 plots across these 3 fires in 2014.

Methods: The plots are 16-m x 1-m belt transects and were established using the 2001 photos as a guide to locate plot center and match the 2014 transect azimuth to the existing photos. Some transect azimuths were modified because of access or there were no matching photos. A Garmin GPS was used to collect coordinates for plot center and Trimble units were used for the 0-m and 16-m transect ends. The plots are not permanently marked. Photos were taken at each plot from the transect ends in both vertical and horizontal orientations. Plot data collection included: general site description, point intercept (32 points on a 16-m transect) to measure ground and vegetation cover, tree density by species and diameter size class within 16-m² area (16-m x 1-m belt), tree measurements (two of each species for each diameter size class), seedling density within three 1-m radius circular plots (located at 4-m, 8-m, and 12-m on 16-m transect), and active layer depths and soil temperatures at 8 points along the 16-m transect. Data in FFI has seedling density under quadrat density, area for quadrat in header is m² for 1 subplot.